Norges teknisk–naturvitenskapelige universitet
Institutt for matematiske fag

Fasit auditorieøving 7 for TMA4100 Uke 39, 2007.

1 **a)** $x_{n+1} = x_n - \frac{x_n^3-2}{3x_n^2} = \frac{2}{3}\left(x_n + \frac{1}{x_n^2}\right)$
$x_1 \approx 1.2963$
b) $x_{n+1} = x_n - \frac{x_n-\cos x_n}{1+\sin x_n}$, $\quad (f(x) = x - \cos x)$
$x_1 \approx 0.7552$

2 $a = 400$ m, $r = 400/\pi \approx 127.3$ m.
$(A = 2ar = a(1600 - 2a)/\pi)$

3 $x_1 = 0$, $x_2 = \ln 2$. $\quad (\mathrm{e}^x = u$ gir $u^2 - 3u + 2 = 0)$

4 **a)** $f'(x) = \frac{1}{x^2-1}$ $\quad (f(x) = \frac{1}{2}[\ln(x-1) - \ln(x+1)])$
b) $f'(x) = \frac{1}{2\sqrt{x(1-x)}}$ $\quad ((\arcsin x)' = \frac{1}{\sqrt{1-x^2}})$
c) $f'(x) = \frac{-1}{x^2+1}$ $\quad ((\arctan x)' = \frac{1}{1+x^2})$

5 **a)** $L = \frac{1}{2}$
b) $L = \lim_{x\to\infty} \sqrt{\frac{x^2+2}{(2x+1)^2}} = \frac{1}{2}$
c) $L = \lim_{x\to 1} \frac{x-1-\ln x}{(x-1)\ln x} = \frac{1}{2}$
d) $L = \frac{1}{\sqrt{\mathrm{e}}}$, $\quad (\ln[(\cos x)^{1/x^2}] = \frac{\ln\cos x}{x^2})$

6 **a)** $\frac{x^3}{3} - \frac{1}{x} + C$, $\quad (\frac{x^4+1}{x^2} = x^2 + \frac{1}{x^2})$
b) $\cos\frac{1}{x} + C$, $\quad (u = \frac{1}{x}, \mathrm{d}u = -\frac{1}{x^2}\mathrm{d}x)$